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MEMORANDUM FOR: Deputy Director (Research)

6 FEB 1963

SUBJECT : U-2 Conference on Aircraft and Camera Malfunctions

1. A conference was convened at the Headquarters Building on 30 and 31 January 1963 for the purpose of analyzing and resolving problem areas associated with the sharp increase in U-2 operational failures in the Far East. Technical representatives of Lockheed and Eastman Kodak were present as well as home office and field technicians of the Hyeon Company. The conference was divided into two sessions of one day each, to discuss separately the aircraft and camera malfunctions. A list of conferees attending each of the sessions is attached.

2. Discussions pertaining to aircraft malfunctions were largely limited to the following significant areas:

- a. Inverter failures
- b. Pressure fluctuations in Cabin and Q-Bay
- c. Auto-pilot difficulties
- d. Alternator
- e. Maintenance and Quality Control

It should be noted that [] of Lockheed had been sent TDY to both [] and [] on 18 January to conduct maintenance training in the inverter as well as to inspect and adjust faulty inverters removed from the aircraft. [] is scheduled to come to Headquarters after discussions with the Edwards group to give a report of his findings and corrective action taken at the field detachments visited.

3. [] and [] have reported that as a result of [] visit, inverters have been checked and adjusted properly and are considered functionally reliable. Lockheed has been requested to develop an engineering study leading to the possibility of installing a back-up inverter in the U-2.

4. Concerning the problem of pressure fluctuations in the Cabin and Q-Bay, each overseas detachment was directed to replace across-the-board various pressure valves and regulators in the

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cockpit and Q-Bay, and to perform other checks in the aircraft to assure the pressurization system operative. This work has been completed, and flight checks made by both ☐ and ☐ 25X1A report no further problem in pressure fluctuation. Such valves and regulators replaced as a result of this exercise are being returned directly to Lockheed for inspection and functional checks.

5. The auto-pilot problem has been one of continuing concern to both the Project and the Lockheed people. The present piece of equipment is outdated and troublesome to maintain. Nonetheless, the auto-pilot is considered acceptable for operational use. Lockheed has been requested to submit an engineering study for a new auto-pilot for the U-2. The study is to include both the cost and time period involved to install a more modern and reliable auto-pilot in Project aircraft. Further information will be reported on this improvement as soon as the study is completed.

6. Because of repeated failures with the alternator, LAC was requested in March 1962 to develop an improved alternator. A new product was obtained almost immediately but flight test of the item was delayed until January 1963 because of lack of a test aircraft. It is now anticipated this item will complete flight test and be accepted by 1 April 1963. Modification of the fleet should follow in about 3 months.

7. During the general discussion phase which dealt largely with the management aspect of U-2 maintenance and materiel, the following salient points were developed:

a. To improve overall communications among field maintenance personnel, Lockheed field managers would be brought into LAC for discussions of mutual problems, and exchange of ideas. It was felt that such a meeting could be scheduled twice a year.

b. Improvement is necessary in reporting maintenance difficulties and unsatisfactory performance so as to provide Lockheed with a clearer picture of the malfunction or failure.

c. A need exists at Headquarters to pursue in a more positive manner the need for product or component improvements. OSA/DOR is to establish an appropriate system to pursue each change recommended by field detachments, and to staff such requirement to a final conclusion.

d. Maintenance history folders are to be established in OSA/DOR in greater detail than now applied. Equipment malfunctions are to be followed in closer detail to obtain an early fix on

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problem areas and to enable corrective action to be taken before the problem becomes widespread.

e. Intensified efforts are to be given to improving quality control of Lockheed and Air Force supplied components. OSA will expand its present policy of having Lockheed assume quality control over Air Force supplied parts found to be unsatisfactory in performance. Overall quality control of Lockheed parts by functional testing and analysis to be reviewed by Lockheed. OSA will develop more detailed historical data on parts failures to detect significant trends in parts usage and to take corrective action as necessary.

8. The second day of the conference dealt with camera malfunctions and general management principles in camera maintenance, in conjunction with film problems and aircraft problems related to the camera. Because of the broader purpose and special requirements of this meeting, Hycon field representatives of the overseas detachments, the SAC Del Rio tech rep, and the Special Projects Office at Wright Patterson Air Force Base were brought to Headquarters to deal with the camera problem.

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9. Early in January 1963, [] Chief Engineer of Hycon, was sent to [] and [] to render technical assistance to the field representatives and to analyze maintenance procedures being used. His trip provided much valuable information to make needed revisions to maintenance schedules and overhaul procedures previously employed by Hycon. Additionally, a new nickel sleeve solenoid vacuum valve assembly was developed on a crash basis to overcome repeated failures the Project was experiencing in the cadmium plated sleeve. Several flight tests on the camera have been conducted since the new nickel sleeves were installed at each detachment, and the camera is now declared to be functionally reliable.

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10. In the early portion of discussions concerning camera problems, a malfunction as a result of film binding was reviewed. This particular failure was experienced in the use of the 4" film spool in the camera. Action was taken to restrict the use of 4" spooled film for training missions only and that 6" spooled film would be used for operational missions. It should be noted that the Project had standardized with SAC on the 6" spool in April 1962; however, adequate stocks of 6" spools have not been available until very recently. Hycon will develop a procedure for inspection of spool cores to be followed by Kodak personnel prior to spooling film on the reusable cores.

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11. A problem of telescoping of film on the spool was presented by the [] detachment. It appears that the problem is most serious at []. The Kodak people felt that much of

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25X1A this problem was due to transportation, and the various temperature changes experienced by the film en route from the depot to ☐. Two actions were taken on this problem: (1) Kodak was requested to develop an inner packing of light plastic material to cushion the film against shock in handling during shipment, and (2) a courier would be sent on several film shipments from the depot to ☐ to report on the handling of the film at various shipping points until it arrives at the final destination. (NOTE: Arrangements have been made for courier to escort a film shipment leaving the depot for ☐ on 6 February.)

25X1A 12. Hycon was requested to develop an Engineering Change Proposal for an improved Tension Sensor Assembly after discussion revealed inherent weaknesses in this major component of the camera.

25X1A 13. Considerable discussion was held on the solenoid failures in the vacuum valve assembly. The SAC Del Rio tech rep reported he had also experienced difficulty with the new solenoids but reverted to the older style to preclude airborne failures. Hycon admitted the new solenoid had been introduced as an improvement to the older assembly but that sufficient testing of the new solenoid had not been accomplished prior to its introduction last April.

14. The Hycon camera maintenance manual is being revised to incorporate needed changes in cyclic inspection of components and replacement of parts. Additionally, overhaul and inspections at the plant will be broadened to include a higher degree of replacement parts than previously used by the manufacturer. Quality control of parts supplied to the depot will be reviewed at the depot to remove unserviceable and obsolete parts accumulated in the program. In addition, Hycon is to time date inspection of critical items of depot stocks and indicate on each item when the part should be returned to the plant for inspection. (NOTE: Hycon has been requested to arrange a visit to the depot to screen depot stocks as to currency of application and to institute various quality control measures to insure stock issues of parts will be acceptable for use in the field.)

15. Action is to be taken by Hycon to add a power cable assembly to the field kit of replacement parts and to include instructions for its periodic replacement. These cables had previously been replaced only during the IRAN of the camera. Field reps indicated a need to have this item available in the field to improve the maintenance capability.

16. The serious problem of temperature and humidity within the Q-Bay at various altitudes was discussed at length. Hycon believes the environment in the Q-Bay may have a definite

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relationship to the performance of the camera. LAC has been requested to conduct an engineering study of temperature and humidity changes occurring within the Q-Bay during flight. The study is to be conducted in Art 332 at LAC during periods when the aircraft is not being used in the OXCART test program.

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17. There was agreement on the need for more informative communications between the detachments, Project Headquarters, Hycon, Kodak, NPIC, and [] Improved reporting procedures will be established to provide adequate cross-exchange of information on camera malfunctions and film read-outs.

18. At each meeting, the qualifications and security consciousness of contractor personnel were discussed. It was pointed out that the majority of Hycon and LAC technicians have been with the project since its inception. They are all highly skilled, very well motivated, and extremely loyal. No security problems associated with the contract personnel were reported. It was agreed that no higher calibre personnel could be obtained.

19. In conclusion, it was consensus of opinion of those in attendance at the conference that the discussions that had taken place were extremely valuable to all concerned. In bringing together the responsible people, to deal with various problem areas highlighted during the conference, numerous ideas for improvement in the maintenance and materiel program were brought forth. Actions developed during the conference have been drafted and appropriate messages sent to various contractors, eg. LAC, Hycon, EK & Co. Follow-up is being instituted within OSA to assure conclusive steps taken on each action item.

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JACK C. LEDFORD
Colonel USAF
Assistant Director
(Special Activities)

Attachment: 1 Attendees to Conferences
on Aircraft and Camera
Malfunctions

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